



FUTURE GOALS™

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Muscles in Motion – Part 1 Student Lab Packet

Name: _____ Date: _____

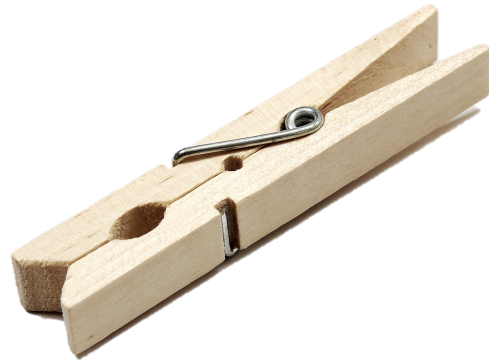
Muscles in Motion – Part 1

How does fatigue affect your muscles?

Purpose: In this experiment I will be measuring _____
by _____.

Procedure:

1. Gather all lab materials with your lab group. You can have up to 3 people in your lab group. Your group will need a clothespin and some way to keep track of time.
2. Assign one person to be the test subject, one person to keep track of time, and one person to record the data.
3. The test subject will hold the clothespin, and try and squeeze it as many times as possible in 2 minutes (120 seconds). The test subject should count the number of squeezes out loud.
4. Every 20 seconds, record the total number of squeezes the test subject has completed.
5. Switch the responsibilities for each person, and repeat the procedure until each person is the test subject.



Create Your Hypothesis:

If I squeeze the clothespin for several minutes, the number of squeezes I can complete in 20 seconds will be _____ because _____.

Data Collection:

Person #1 Name: _____

Person #2 Name: _____

Person #3 Name: _____

Record the number of squeezes for each test subject in the table below:

	Person #1	Person #2	Person #3	Average
20 sec				
40 sec				
60 sec				
80 sec				
100 sec				
120 sec				

Hint: You can calculate the average number of squeezes by adding up the number of squeezes for Person #1, #2, and #3 and then dividing by 3.



Data Analysis:

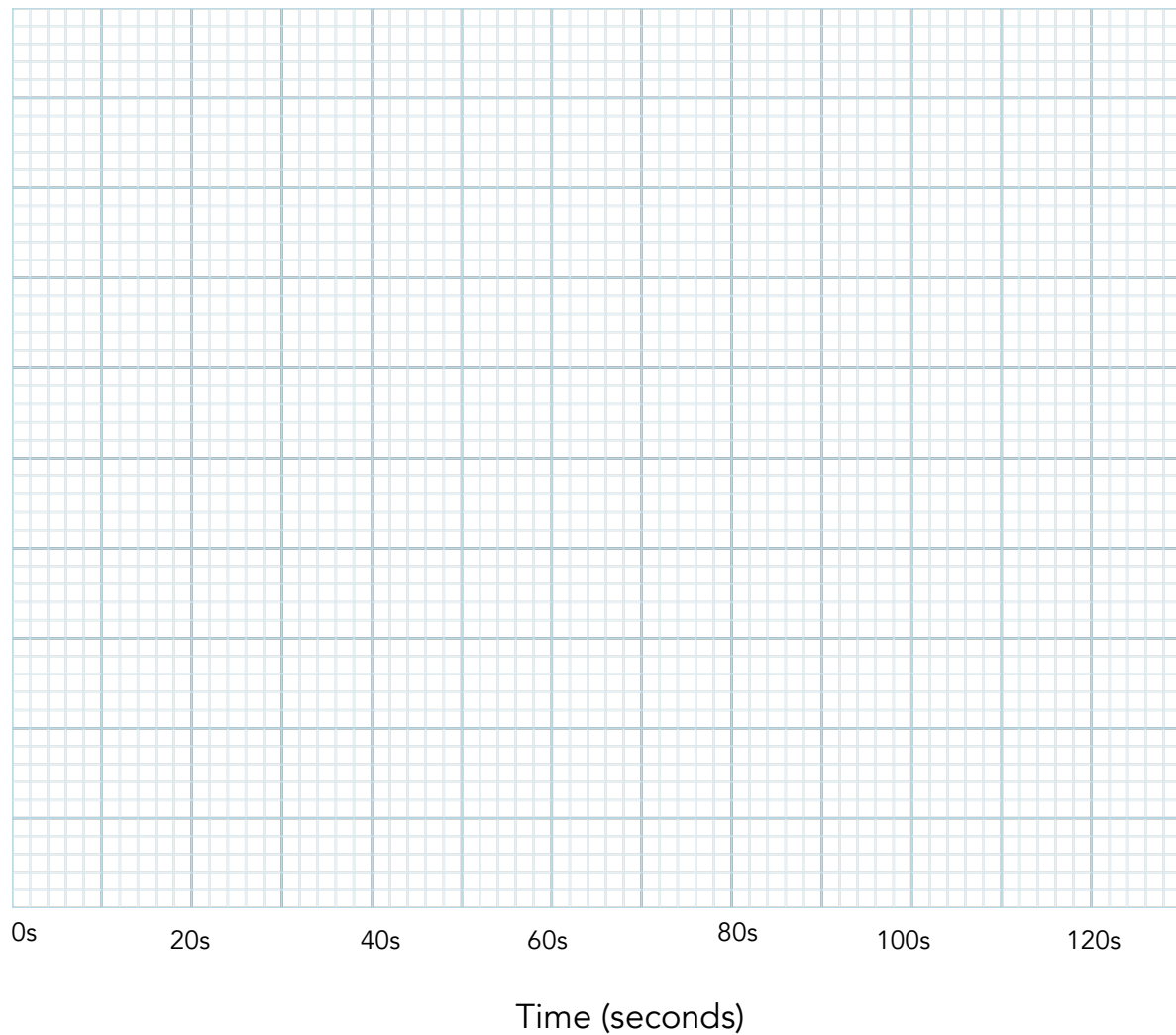
1) In the first minute (60 seconds), I was able to open and close the clothespin a total of _____ times. In the second minute, I was able to open and close the clothespin a total of _____ times. Overall, I noticed that the speed at which I opened and closed the clothespin _____.

2) In the first minute, how many squeezes were the test subjects able to complete? How did this change in the second minute?

3) Did you observe similar results across all three people? Is this what you expected? Why?

4) How do you think fatigue could affect an athlete competing for a long period of time?

- 5) Create a line graph of the number of squeezes you completed over time below. Graph the results for all 3 people in your lab group by using different colors for the three line graphs. Don't forget to include a key!



Line Graph Key:

Record the color you used for each person below.

- ☐ Person #1
- ☐ Person #2
- ☐ Person #3



Conclusion:

Did you observe muscle fatigue in your hand muscles over the course of your experiment? How do you know?



FUTURE GOALS™

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Muscles in Motion - Part 2 Student Lab Packet

Name: _____ Date: _____

Muscles in Motion – Part 2

How does temperature affect your muscles?

Purpose: In this experiment I will be measuring _____
by _____.

Procedure:

6. Gather all lab materials with your lab group. You can have up to 3 people in your lab group. Your group will need a clothespin, ice water, and some way to keep track of time.
7. Assign one person to be the test subject, one person to keep track of time, and one person to record the data.
8. The test subject will hold the clothespin, and try and squeeze it as many times as possible in 1 minute. The test subject should count the number of squeezes out loud.
9. The same test subject will now place his or her hand in ice water for 30 seconds. Note: if your test subject's hand starts to feel too painful or uncomfortable, remove it from the ice water. As soon as the test subject's hand is out of the ice water, have them squeeze the clothespin as many times as possible in 1 minute. Record the total number of squeezes.
10. Switch the responsibilities for each person, and repeat the procedure until each person is the test subject.



Create Your Hypothesis:

If I squeeze the clothespin after placing my hand in ice water, the number of squeezes will be _____ because

_____.

Data Collection:

Person #1 Name: _____

Person #2 Name: _____

Person #3 Name: _____

Record the number of squeezes after 60 seconds for each test subject in the table below:

	Total squeezes after 60 seconds	
	Room temperature	After ice bath
Person #1		
Person #2		
Person #3		



Data Analysis:

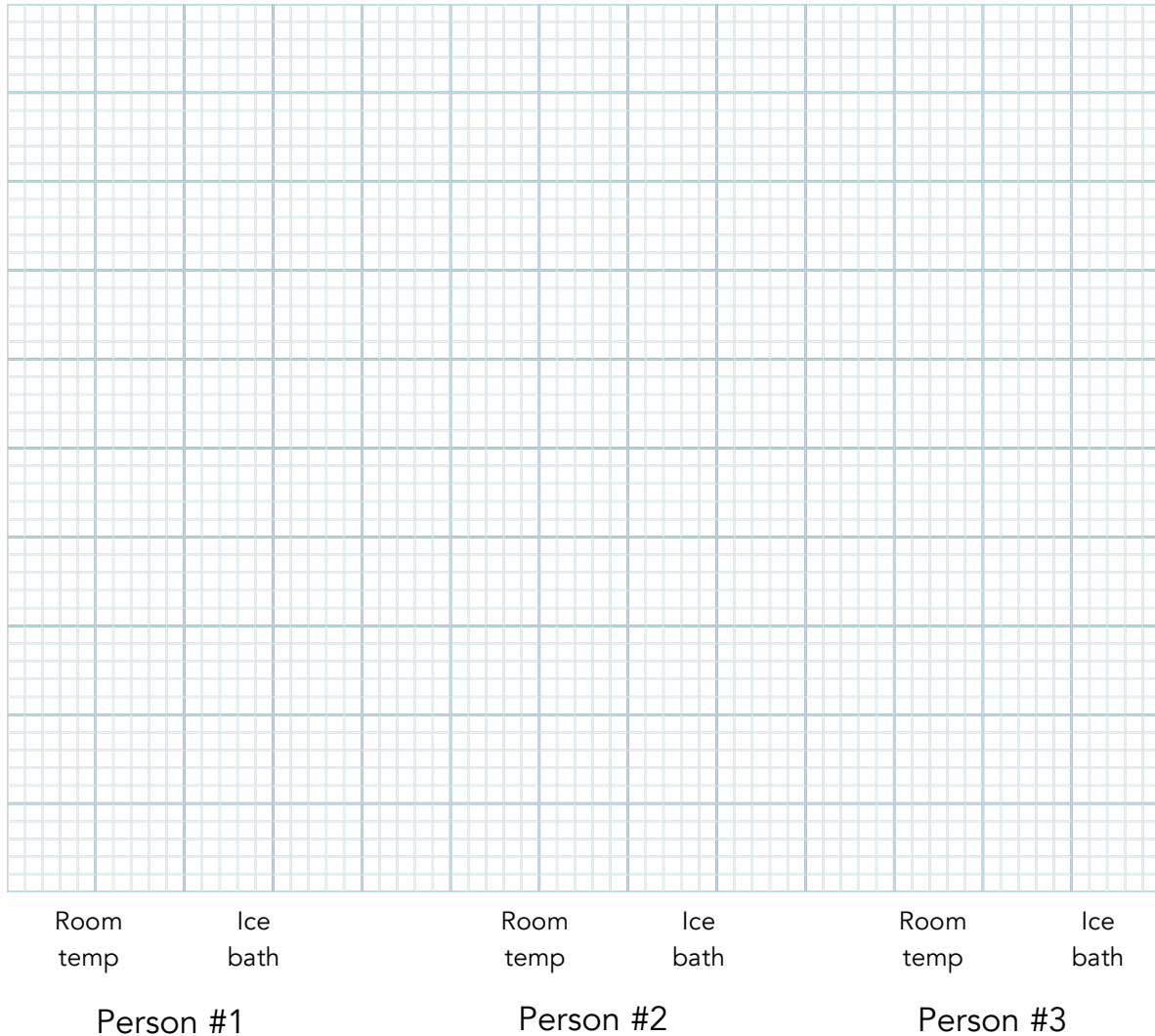
1) In the first minute (60 seconds), I was able to open and close the clothespin a total of _____ times. After placing my hand in ice water, I was able to open and close the clothespin a total of _____ times. Overall, I noticed that the speed at which I opened and closed the clothespin _____ after I put it in the ice water.

2) How did the number of squeezes change after placing your hand in ice water?

3) Did you observe similar results across all three people? Is this what you expected? Why?

4) How do you think cold temperatures could affect an athlete? What effect do you think extreme heat would have?

- 5) Create a bar graph of the number of squeezes you completed over time below. Graph the results for all 3 people in your lab group at room temperature and after the ice bath. Don't forget to include a key!



Bar Graph Key:

Record the color you used for each temperature

□ = Room temperature

□ = Ice bath



Conclusion:

Did you observe changes in the performance of your hand muscles at different temperatures? How do you know?
